Impact of soft tissue balance and alignment on 2-year outcomes in TKA

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INTRODUCTION:

The impact of alignment and laxity on mid-term patient reported outcomes in total knee arthroplasty (TKA) is not well understood. In this study we investigate the impact of component alignment and intra-operative joint laxity on 2-year pain outcomes and hypothesize that clinically relevant laxity windows associated with improved pain outcomes may be identified.

METHODS:

Two hundred sixty-six patients were enrolled in a prospective cohort and received robot assisted posterior-cruciate-ligament sacrificing TKA with an ultra-congruent tibial insert utilizing a tibia-first gap-balancing approach. Demographics were captured pre-operatively and KOOS pain score was captured at 2-years post-op. Final joint laxity throughout flexion was measured immediately prior to implantation. Tibial and femoral resection angles were recorded. Associations between laxity, balance and alignment and KOOS pain scores were investigated. Mann-Whitney-U tests were used to compare groups defined by laxity thresholds. The proportion of knees which satisfy the Patient Acceptable Symptom State (PASS) for pain at 3-years was used to determine the clinical utility of the targets for achieving improved outcomes.

RESULTS:

Demographics are: 58%F, 67±8 years, BMI of 32±5 kg/m^2, coronal deformity of 5.2°±6.2° varus. Balance and laxity windows for improved pain scores were identified throughout flexion (Table 1). When all targets were satisfied, an improved pain score was achieved compared to those that did not (93.8vs88.0, p=0.0001). The proportion of knees which satisfied the PASS criterion was highest in knees which satisfied all targets (83%) with a 26% improvement compared to knees which did not (p=0.008), see Figure 1. No associations were identified between femoral or tibio-femoral component alignment and outcome.

DISCUSSION AND CONCLUSION:

Joint balance and laxity targets were identified for improved pain scores 2 years after TKA. No association was found between alignment and outcome, indicating joint balance may have a greater impact on outcome than alignment.

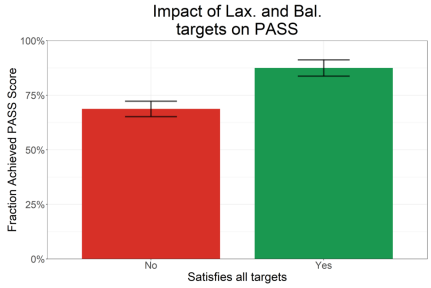

Figure 1 Impact of satisfying all soft tissue targets on achieving 3-Year KOOS PASS pain threshold. Knees which satisfy all targets report a 26% improvement in PASS score.

Table 1 Summary of soft tissue targets for optimizing 2-year pain outcomes. Balance is defined as the difference between the medial and lateral gaps. Laxity is defined as the difference between the joint gap and insert thickness used.

Flexion Angle	Balance (mm)		Laxity (mm) - = tighter + = looser
	Tighter Med.	Tighter Lat.	
Extension	< 2.5	< 1.5	Med: -1 to 2.5
Midflexion	< 1.5	< 1.0	Avg: 0 to 2.5
Flexion	< 2.0	< 1.5	Avg: 0 to 2.5